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Abstract of the Disclosure

A magnetron source, a magnetron treatment chamber, and a method of manufacturing substrates with a vacuum plasma treated surface, generate and exploit on asymmetrically unbalanced long-range magnetron magnetic field pattern which is swept along the substrate surface for improving the ion density at a substrate surface being vacuum plasma treated. The long-range field reaches the substrate surface with a component of the magnetic field parallel to the substrate surface of at least 0.1, and preferably between 1 and 20, Gauss. The plasma treating can be sputter-coating, or etching, for example.